

Green Infrastructure Stormwater Nitrogen BMP

SAMPLING PROTOCOL

STANDARD OPERATING PROCEDURES

October 5, 2017 – Version 3.2

Intersection of South Street and Pleasant Street

Barnstable, MA

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Attachment A: Bacteria Sampling SOPs

Attachment B: Sampling Checklists

Attachment C: Equipment Inventory

Attachment D: Quality Assurance Project Plan (QAPP)



1. OVERVIEW

Introduction

The coastal embayments of Cape Cod have historically received excess nitrogen loadings, with a portion of nitrogen coming from stormwater runoff. Consequently, the Massachusetts Estuaries Project (MEP) developed total maximum daily load allocations (TMDLs) for many southern Massachusetts embayments including those in Cape Cod. To begin the process of reaching the TMDL goals, the Town of Barnstable partnered with the United States Environmental Protection Agency (EPA), WaterVision, LLC, and Comprehensive Environmental Inc. (CEI) to initiate a pilot project in Cape Cod in 2014 and demonstrate the effectiveness of nitrogen load-reducing stormwater BMPs. This project was designed to monitor and quantify the BMP performance for nitrogen removal.

Sampling Program Background

The purpose of the monitoring program for the Barnstable BMP is to quantify the nitrogen load-reduction performance of the subsurface gravel wetland. To quantify the effectiveness of the Barnstable subsurface gravel BMP, parameters including flow, total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) will be gathered at the inlet and outlet of the BMP. These measurements will be analyzed to compare the percentage of nutrients and sediment entering and leaving the treatment system.

The above laboratory-analyzed sampling data will be supplemented through the use of data collected using automated sondes also located at the entrance and exit of the treatment system which regularly take readings at fixed intervals. Sondes will automatically measure dissolved oxygen (DO), temperature, conductivity, and pH which can then be matched to other data by reviewing the time and date of collection.

Optional bacteria sampling at both the inlet and outlet may also be performed by collecting manual grab-samples using the SOPs for bacteria collection provided in **Attachment A** for analysis by a laboratory chosen by the Town. Note that for Barnstable, a separate bacteria grab sample should be collected from within the trunk line baseflow as a “background” or baseline condition, for a total of 3 samples.



It is anticipated that data will be collected for 20 or more rain events or varying intensities and rainfall depths over a period of two to five years. Ultimately, successful reduction of nitrogen loadings, along with phosphorus and total suspended solids loadings, from the stormwater runoff entering Hyannis Harbor will promote further stormwater BMP development in Cape Cod to reach TMDL recommendations for nutrient removal.

Purpose of this Document

The following Standard Operating Procedures (SOPs) and checklists in ***Attachment B*** contained within this document are intended to provide easy to follow instructions on how to perform ongoing sampling events, including what to do before a storm begins, how to sample during a storm, periodic maintenance required, along with other pertinent information that may be applicable to volunteer personnel. Summary sheets on equipment and pertinent information is located in ***Attachment C***.



2. AUTO-SAMPLER PROGRAMMING

Purpose:

This section outlines the initial programming setup for flow sampling from the flow-weighted composite (FWC) and discrete time interval (DTI) sampling units.

Equipment Overview:

At the time of preparing this document, there are three Auto-Samplers located in the basement of the Cape Cod Maritime Museum, one for the inlet to collect FWC samples, one for the outlet to collect FWC samples, and an additional one for the inlet to collect DTI samples, however may be relocated to the Chatham site at a later date.

Initial Programming:

As noted in the QAPP, intervals may be adjusted based on results obtained during the ongoing sampling program. As a starting point per the information provided in the Quality Assurance Project Plan (QAPP) in **Attachment D** prepared by EPA, samplers are pre-programmed to collect samples at the following intervals and quantities:

BMP Inlet (FWC)

Sample #	Time	Qty.	Sample #	Time	Qty.
1	5 min.	800 mL	13	9 hrs.	800 mL
2	15 min.	800 mL	14	10 hrs.	800 mL
3	30 min.	800 mL	15	11 hrs.	800 mL
4	60 min.	800 mL	16	12 hrs.	800 mL
5	2.0 hrs.	800 mL	17	13 hrs.	800 mL
6	2.5 hrs.	800 mL	18	14 hrs.	800 mL
7	3 hrs.	800 mL	19	15 hrs.	800 mL
8	4 hrs.	800 mL	20	16 hrs.	800 mL
9	5 hrs.	800 mL	21	18 hrs.	800 mL
10	6 hrs.	800 mL	22	20 hrs.	800 mL
11	7 hrs.	800 mL	23	22 hrs.	800 mL
12	8 hrs.	800 mL	24	24 hrs.	800 mL



BMP Outlet (FWC)

Sample #	Time	Qty.	Sample #	Time	Qty.
1	5 min.	800 mL	13	10 hrs.	800 mL
2	15 min.	800 mL	14	11 hrs.	800 mL
3	30 min.	800 mL	15	12 hrs.	800 mL
4	60 min.	800 mL	16	14 hrs.	800 mL
5	2 hrs.	800 mL	17	16 hrs.	800 mL
6	3 hrs.	800 mL	18	18 hrs.	800 mL
7	4 hrs.	800 mL	19	20 hrs.	800 mL
8	5 hrs.	800 mL	20	22 hrs.	800 mL
9	6 hrs.	800 mL	21	24 hrs.	800 mL
10	7 hrs.	800 mL	22	28 hrs.	800 mL
11	8 hrs.	800 mL	23	32 hrs.	800 mL
12	9 hrs.	800 mL	24	36 hrs.	800 mL

BMP Inlet (DTI)

Sample #	Container #	Time	Qty.
1	1	5 min.	800 mL
	2		800 mL
2	3	15 min.	800 mL
	4		800 mL
3	5	30 min.	800 mL
	6		800 mL
4	7	60 min.	800 mL
	8		800 mL
5	9	2 hrs.	800 mL
	10		800 mL



3. PRE-SAMPLING EVENT PROCEDURES

Purpose:

Follow the procedures below when visiting the site before an expected storm-sampling event to ensure all equipment is in operational order.

Step 1: Continually check the future weather forecast (i.e. National Weather Services, Weather Underground, etc.) for potential upcoming rain events. Recommended storm events will have durations of greater than six hours and less than 24 hours, and produce at least 0.35-inches of precipitation, thus triggering approximately 0.3-inches of stormwater runoff.

Step 2: Go to the Cape Cod Maritime Museum located at 135 South Street, Hyannis, MA or near the intersection of South Street and Pleasant Street in Barnstable, MA. Sampling equipment is located in the basement, nearest the external door behind the boat shed. See photos below.



Figure 1: Auto-Samplers



Figure 2: Signature Flow Meters

Step 3: Unfasten the 3 metal bottom latches on the Auto-Sampler, remove the top from the base and set aside to expose the carousel with sample bottles and holders. Caution! Top may be heavy.

Step 4: Ensure that the base is filled with sample bottles and holders are properly locked in place. The base should contain 24 1-liter sample bottles. Replace any missing bottles if necessary and ensure that no caps are in place.

Step 5: Gently test the distributor arm at the bottom of the base cover to ensure proper alignment.

Step 6: Carefully replace the top section of the Auto-Sampler onto the base and re-latch the cover in place. Caution! Top may be heavy.

Step 7: Open the rubber top latches on the Auto-Sampler to access the control panel, remove the cover and set aside.

- The Auto-Sampler should be connected to the Signature Flow Meter and plugged into an outlet on the wall.
- Press the Home button and observe the display screen on the Auto-Sampler to ensure that it is powered on.

Step 8: Turn on the Auto-Sampler by pressing the ⓘ button.

Step 9: Carefully replace the Auto-Sampler cover and re-latch the cover in place.

Step 10: Verify that the Signature Flow Meter is on.

- The Signature Flow Meter should be plugged into an outlet on the wall.
- Press the Home button and observe the display screen on the Signature Flow Meter to ensure that it is powered on.

Step 11: Repeat the above procedures for the remaining Auto-Samplers and Signature Flow Meter.

Step 12: Notify Ray Cody, EPA about the potential rainfall event and anticipated stormwater samples (see included Contact Sheet).



4. SAMPLING PROCEDURES

Purpose:

Follow the procedures below when retrieving samples after a storm event. Due to the extended duration of the sampling program, these tasks should take place at least 24-hours after the storm-sampling event is completed, but not longer than 48-hours.

Step 1: Go to the Cape Cod Maritime Museum located at 135 South Street, Hyannis, MA or near the intersection of South Street and Pleasant Street in Barnstable, MA. Sampling equipment is located in the basement, nearest the external door behind the boat shed. See photos below.



Figure 1: Auto-Samplers



Figure 2: Signature Flow Meters

Step 2: Inspect the general condition of all of the equipment, tubing, casing, cables, and sensors. Note any irregularities.

Step 3: Open the rubber top latches on the Auto-Sampler to access the control panel, remove the cover and set aside.

Step 4: Turn off the Auto-Sampler by pressing the  button.

Step 5: Unfasten the 3 metal bottom latches on the Auto-Sampler, remove the top from the base and set aside to expose the carousel with sample bottles and holders. Caution! Top may be heavy.

Step 6: Carefully screw covers onto each sample bottle to prevent sample spillage. Note that sample bottles will be aligned with a number on the side of the carousel.

- The inlet FWC Auto-Sampler should be filled with 24 sample bottles, however may not fill all bottles depending on storm duration and flow characteristics.
- The outlet FWC Auto-Sampler should be filled with 24 sample bottles and should always fill all 24 bottles with samples. If not, then it is possible that the Auto-Sampler has not yet finished sampling the entire storm.
- The DTI Auto-Sampler should always use 10 sample bottles, consisting of 5 samples (1 sample per 2 bottles).

Step 7: Remove the full carousel for transport back to the office for Post-Sampling and Sample Preparation Procedures under a separate SOP. Be sure to keep track of which carousel came from which sampler! Carousels and samplers are labeled.

Step 8: Replace the full carousel with an empty carousel filled sample bottles and holders per the Post-Sampling and Sample Preparation Procedures SOP. Ensure that no caps are present.

Step 9: Carefully replace the top section of the Auto-Sampler onto the base and re-latch the cover in place. Caution! Top may be heavy.

Step 10: Compare bottles within the full carousel and ensure the correct bottles were filled according to the Auto-Sampler readings. Note any irregularities.

Step 11: Visually check to see if the sample volume appears to correspond with sample bottles according to the Auto-Sampler readings. Note any irregularities.

Step 12: Carefully replace the Auto-Sampler cover and re-latch the cover in place.

Step 13: Download all data from the Signature Flow Meter and save the data on the provided USB thumb drive for this monitoring program.



- Connect a USB thumb drive to the micro-USB cable, available within the Signature Flow Meter cover. A *USB Options* menu will automatically appear.
- If not, select the Menu option on the Home screen. (Note: *USB Options* menu will only appear if a USB connection is detected by the Signature Flow Meter).
- Select USB Options > Retrieve Text Reports or Retrieve Data.
- Retrieve Text Reports allows you to download all reports, all reports since a certain date, or all reports in a time/date range.
- Retrieve Data allows you to download all data, all data since a certain date, or data in a time/date range.
- Be sure to check the box to export or save as a .csv file (comma separated value), as this can be read in Excel.
- To download Text Reports or Data, press Enter on the desired option and leave the USB thumb drive connected to the Signature Flow Meter during the downloading process. This will download data such as flow in and out of the BMP, data collected automatically via the sondes, and the time and date of each measurement.
- Make sure to leave USB thumb drive connected until it is fully complete. It can stay at 100% for some time (10 minutes at times) to complete data download and conversion.
- Take the USB thumb drive to a computer and email the file(s) to: Ray Cody, EPA, cody.ray@epa.gov. Data will in part be used to calculate FWC aliquots.

Step 14: Document the following after each storm sampling event in a field book or field data sheets:

- Take note of the total number of samples collected at each sampling site including the FWC grab samples, DTI grab samples, and any other in-situ sampling.
- Record the number of samples that were unsuccessfully collected.
- Record the time of the first sample and the last sample and take note of when the rainfall and stormwater runoff ended.
- Note any excess sedimentation or debris accumulation on and around the equipment and sampling location.
- Note any maintenance activities that need to be followed-up before the next storm-sampling event.

Step 15: Proceed to Post-Sampling and Sample Preparation Procedures SOP.



5. POST-SAMPLING AND SAMPLE PREPARATION PROCEDURES

Purpose:

Follow the procedures below after a sampling event has been completed in order to prepare samples to send to the EPA laboratory for analysis.

Step 1: Bring the full carousels to an appropriate work area with plenty of space and light. Take care not to mix up carousels or alter the location of sample bottles within the carousel.

For samples to be flow-weighted composited, proceed to Step 2. For discrete samples, proceed to Step 3.

Step 2: This step should only be performed for samples to be flow-weighted composited. Discrete samples should not be composited! Flow-weighted composite (FWC) grab samples will need to be composited by the Town in-house before shipping to EPA.

Once flow data has been sent to EPA as outlined under the Sampling Procedures SOP, EPA will respond with instructions on how to flow-weight the composite samples. This will be performed by collecting a certain volume aliquot from each sample bottle and compositing them into a single EPA-provided bottle to represent the entire storm event.

Prior to uncapping and collecting any sample aliquot, gently shake the sample bottle to ensure water within is thoroughly mixed. Thoroughly rinse and sanitize any instruments between aliquots.

Note that two bottles will be needed, 1 for TN/TP and 1 for TSS, so each sample will have 2 aliquots of equal volume collected, one for each EPA-provided sample bottle.

Label each one as follows:

<site> <sample type> <analyte> <location> <date; time>

- site: B = Barnstable



- sample type: FWC = Flow-weighted composite samples
- analyte:
 - TN/TP = Total Nitrogen / Total Phosphorus
 - TSS = Total Suspended Solids
- location:
 - I = Inlet
 - O = Outlet
- date; time:
 - mm/dd/yy; hour:min (where time is time at which the storm began)

Example: A TN/TP sample collected from the outlet FWC sampler at the Barnstable BMP outlet at 7:57 PM on October 17, 2017 after storm initiation recorded as 6:10 PM: “B FWC TN/TP O 10-17-17; 6:10 PM”.

Proceed to Step 4.

Step 3: This step should only be performed for discrete samples. Note that the Signature Flow Meter records the time, data, and bottle number, indexed off of the inside of the Auto-sampler. Carefully remove each sample bottle from the base of the Auto-Sampler and pour into a 1-liter EPA-provided bottle, taking careful note of the indexed number within the carousel. Label each one as follows:

<site> <sample type> <analyte> <location> <date; time> <sample #> <time>

- site: B = Barnstable
- sample type: DTI = Discrete-time interval grab sample
- analyte:
 - TN/TP = Total Nitrogen / Total Phosphorus
 - TSS = Total Suspended Solids
- location:
 - I = Inlet
 - O = Outlet
- date; time:
 - mm/dd/yy; hour:min (where time is time at which the storm began)
- sample #:



- $n = 1, 2, 3 \dots n$ (where n is the bottle number or sequential order of the sample from when the storm initiated)
- time:
 - t = time after the storm initiated

Example: A TSS sample collected from the inlet DTI sampler on the floor at the Barnstable BMP inlet 1:06 PM on November 21, 2017 after storm initiation recorded as 12:15 PM: "B DTI TSS I 11-21-17 12:15 PM n 1:06 PM", where n is the bottle number.

Proceed to Step 4.

Step 4: Once all samples have been transferred into properly-labeled EPA-provided bottles, they are ready for shipping to EPA. Complete a Chain of Custody:

- Transfer sample labels and times per Steps 3 and 4 onto the Chain of Custody.
- Fill out the Chain of Custody with date, contact information, signature, etc.
- Place the completed Chain of Custody in a one-gallon plastic bag to keep it dry and tape it to the inside lid of the sample cooler.

Carefully place all labeled EPA-provided sample bottles in a cooler with ice packs, resealable plastic bags filled with ice, or plastic bags sealed with a twist-tie filled with ice.

Step 5: Ship or deliver the samples to EPA's National Exposure Research Laboratory (NERL) for analysis with the finalized Chain of Custody.

- Notify Ray Cody, EPA about the potential rainfall event as early as possible (see included Contact Sheet)
- If the samples are being shipped, FedEx the samples overnight using EPA's FedEx account number.
- The samples may be shipped Monday through Thursday. Note that the NERL is closed on Saturday and Sunday, and thus samples collected on a Friday should be mailed out on Monday.

The mailing address is:

EPA New England Regional Laboratory



11 Technology Drive
North Chelmsford, MA, 01863-2431

- If the samples are being delivered, they may be delivered Monday-Friday. The lab is located at 11 Technology Drive, North Chelmsford, MA.

Step 6: Clean and decontaminate all sample bottles for replacement within the carousel.

- Clean with tap water and phosphate-free laboratory detergent, such as 2% Liquinox® or Alconox® and tap water solution.
- Rinse thoroughly with tap water to remove all soap solution.
- Rinse a minimum of three times with analyte free/DI water.
- Allow to air dry completely.

Step 7: Refill sampling carousel for deployment during the next sampling round.

- Once bottles are dry, reinsert all bottles into the carousel and ensure that all bottles and holders are properly locked in place.
- Cover bottles with screw-on caps to prevent atmospheric deposition of contaminants. Each base should contain 24 1-liter sample bottles.
- Store safely for redeployment after the next sampling round.



6. ANNUAL PROGRAM STARTUP GUIDELINES

Purpose:

Conduct the following protocols at least once per year, likely during the initial spring sampling program startup. Upon completion, routine bi-annual maintenance should be performed as outlined in Section 7.

Program Data: Before the first sampling round, download the Current Program settings on the provided USB thumb drive.

- Connect a USB thumb drive to the micro-USB cable, available within the Signature Flow Meter cover. A *USB Options* menu will automatically appear.
- Select the Menu option on the Home screen. (Note: *USB Options* menu will only appear if a USB connection is detected by the Signature Flow Meter).
- Select USB Options > Save Current Program.
- To download the current programming settings, press Enter and leave the USB thumb drive connected to the Signature Flow Meter during the downloading process.

Equipment Connections: Check that the Rain Gauge, Bubbler/Calibrated Flume, and Area-Velocity Sensor are properly connected and functioning using the Signature Flow Meter.

- On the home screen, select the Menu option.
- Select Hardware Setup > Smart Sensor Setup (TIENet)
- This option will display the most recently detected TIENet devices connected to the Signature Flow Meter. If a device is missing, highlight Perform Scan and press Enter.
- Missing Sensors will indicate any previously connected devices that are no longer detected. Select Retain to keep identification information.
- Replaced Sensors displays any newly added sensors that have replaced a Missing Sensor which information had been retained.
- Additional Sensors displays newly added devices.

Sonde Deployment: If sondes were previously removed for calibration, they should be reinstalled and properly connected prior to commencing sampling events.



7. ROUTINE BI-ANNUAL MAINTENANCE GUIDELINES

Purpose:

Conduct the following maintenance protocols on each piece of equipment as specified below or as needed. See attached [Figure 3](#) at the end of this section for the location of all equipment at the Barnstable BMP.

Note that this section outlines routine maintenance only, expected to be encountered during regular operations. For detailed maintenance, or explanations on how to correct an error message, please refer to individual product documentation.

Signature Flow Meter: Conduct maintenance at least twice per year.

- The Signature Flow Meters located inside the Cape Cod Maritime Museum. Access should be through the rear entrance.
- Check condition of desiccant pack, located on the left side of the Signature Flow Meter.
 - Spent desiccant is dark in color whereas fresh desiccant is orange.
 - If desiccant is mostly dark, slide the plastic container off the unit and replace with fresh orange desiccant.
- Open Signature Flow Meter cover to access the screen, keyboard, and USB connections.
- Ensure that the Signature Flow Meter is clear of snow, ice, debris, and sediment.
- Check all cables, tubes, and electrical connections for tightness and/or damage. Replace or conduct maintenance as needed.
- Check the tubing for the Bubbler/Calibrated Flume for kinks/twists and ensure that the tubing is clean of sediment and debris. Straighten, clean, or replace tubing as needed.



- Ensure that the Signature Flow Meter is properly connected to the Bubbler/Calibrated Flume, Area-Velocity (AV) Sensor, Auto-Sampler, and Rain Gauge.
 - On the home screen, select the Menu option.
 - Select Hardware Setup > Smart Sensor Setup (TIENet)
 - This option will display the most recently detected TIENet devices connected to the Signature Flow Meter. If a device is missing, highlight Perform Scan and press Enter.
 - Missing Sensors will indicate any previously connected devices that are no longer detected. Select Retain to keep identification information.
 - Replaced Sensors displays any newly added sensors that have replaced a Missing Sensor which information had been retained.
 - Additional Sensors displays newly added devices.
- Check for the presence of error messages or other abnormal conditions.

ISCO 6712 Sampler: Conduct maintenance at least twice per year.

- The Auto-Samplers are located inside the Cape Cod Maritime Museum. Access should be through the rear entrance.
- The three samplers are located on the floor and are labeled as either FWC inlet, FWC outlet, or DTI inlet.
- Ensure that the ISCO 6712 Sampler, or Auto-Sampler, is clear of snow, ice, debris, and sediment.
- Check suction tubing for kinks/twists and ensure that the tubing is clear of sediment and debris. Straighten, clean, or replace tubing as needed.
- If suction tubing/pump tubing needs to be cleaned using a weak acid such as hydrochloric acid (HCl) and then rinsed with deionized (DI) water.
- Check the humidity indicator by viewing the Internal Case humidity located to the right of the keypad. The paper indicator is blue when the control box is dry. If moisture does accumulate, the numbered areas will turn light pink



or white. If the 30% area of the humidity indicator turns light pink or white, open the control unit, inspect it for leaks, and replace the desiccant bag (part 099-0002-00).

- Check the condition of the peristaltic pump. Replace or conduct maintenance as needed.
- Check that all tubing is properly clamped and connected to the Auto-Sampler.
- Check all electrical connections for tightness and ensure that there is no corrosion and/or damage. Replace as needed.
- Check the strainer and ensure that it is clear of sediment and debris. Clean or replace as needed.
- Ensure that the Auto-Sampler is connected to the Signature Flow Meter.
- Check for the presence of error messages or other abnormal conditions.

Rain Gauge: Conduct maintenance at least twice per year.

- The Rain Gauges are located on top of the Cape Cod Maritime Museum roof, near the rear entrance. A ladder will be required for access.
- Ensure that the exterior of the Rain Gauge is clear of snow, ice, debris, sediment, and bird droppings.
- Loosen the two metal thumb screws and remove the top. Ensure that the interior is free of debris buildup.
- Make sure the Rain Gauge “tipper” can move freely. Note that by moving the “tipper”, the Rain Gauge will think it’s raining. The “tipper” should only be touched when both the Auto-Sampler and Signature Flow Meter are unplugged.



Calibrated Flume/Bubbler: Conduct maintenance at least twice per year.

- The Calibrated Flumes are located at the inlet and outlet pipes of the BMP. They can be accessed by removing the drainage manhole covers.
- Ensure that the Calibrated Flume is clear of snow, ice, debris, and sediment.

- Check that the Bubbler tubing is connected to the Signature Flow Meter.

Area-Velocity Sensor: Conduct maintenance at least twice per year.

- The Area-Velocity Sensors are located at the inlet and outlet pipes of the BMP. They can be accessed by removing the drainage manhole covers.
- Ensure that the AV Sensor is clear of snow, ice, debris, and sediment.
- Check that the AV Sensor is connected to the Signature Flow Meter.



Aqua-Troll 600 Multiparameter Sonde: Conduct maintenance at least twice per year.

- The Aqua TROLL sondes are located within the diversion structure on the inlet side and within the outlet control structure on the outlet side. They can be accessed by removing the drainage manhole covers.
- Note that sondes are equipped with a motorized sensor wiper that will automatically clean the probes and reduce the need for maintenance.
- Clean the sonde with warm water and soap, then rinse.
- Gently rinse and clean around probes with a soft cloth or swab. Do not use harsh solvents or soaps.
- The pH probe has a fill solution that must be replaced every 5 to 6 months, or if adverse operation is noted (see product manual for instructions).
- Ensure pH probe is kept submerged at all times, even if removed for storage.
- Check dessicant kit and replace when it changes from purple to pink (Maintenance Kit 0078940).
- Note that for best results, the sonde should be sent to the factory for calibration every 12 to 18 months.



8. CONTACT INFORMATION

Name, Organization	Project Role	Email Address	Phone #
Sampling Team Leader			
Dale Saad, Ph.D., Town of Barnstable	Senior Project Manager, Barnstable DPW	dale.Saad@town.barnstable.ma.us	508-790-6400 X4941
EPA Contacts			
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Comprehensive Environmental Inc.			
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New England Environmental and Teledyne			
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Carl Cederberg	Equipment Specialist	carl.cederberg@teledyne.com	402-465-3025



9. TROUBLESHOOTING PROGRAMMING PROCEDURES

System error or failure occurred.

- Connect the provided USB thumb drive to the Signature Flow Meter with a micro-USB cable, available within the Signature Flow Meter cover.
- Select the Menu option on the Home screen.
- Select USB Options > Gather Fault Data (Note: The *USB Options* menu will only appear if a USB connection is detected by the Signature Flow Meter).
- This option is capture Flow Meter activity before and during a system error or failure.
- To download fault data, press Enter and leave the USB thumb drive connected to the Signature Flow Meter during the downloading process.
- Gathering fault data will help to troubleshoot why there was a system error or failure.

Signature Flow Meter accidentally reset to default factory settings.

- Connect the provided USB thumb drive to the Signature Flow Meter with a micro-USB cable, available within the Signature Flow Meter cover.
- Select the Menu option on the Home screen.
- Select USB Options > Load Existing Program (Note: The *USB Options* menu will only appear if a USB connection is detected by the Signature Flow Meter).
- This option overwrites the existing program settings with a saved program. Upload the original program settings that were saved during the first sampling event.
- To upload the program settings, press Enter and leave the USB thumb drive connected to the Signature Flow Meter during the uploading process.

To ***view*** or ***download diagnostic reports***.

- Connect the provided USB thumb drive to the Signature Flow Meter with a micro-USB cable, available within the Signature Flow Meter cover.
- Select the Menu option on the Home screen.
- Select Administration > Sensor Diagnostics (Note: To download diagnostic reports, a USB connection must be detected by the Signature Flow Meter).
- This option allows you to view or download system diagnostic reports.



- To download the diagnostic reports, press Enter and leave the USB thumb drive connected to the Signature Flow Meter during the downloading process.

To **view** or **download Signature Flow Meter information**.

- Select the Menu option on the Home screen.
- To view Signature information, select Administration > Display Signature Information
- This option displays the serial number, model number, software version, and hardware version of the Flow Meter and all connected devices.
- To download Signature information, connect the provided USB thumb drive to the Signature Flow Meter with a micro-USB cable, available within the Signature Flow Meter cover.
- Select Home > Menu > USB Options > Save Signature Information.
- Press Enter and leave the USB thumb drive connected to the Signature Flow Meter during the downloading process.

